Proposal Reviews

#210: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

University of California, Davis

Initial Selection Panel Review	
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Prior Performance/Next Phase Funding	
Environmental Compliance	
Budget	

Initial Selection Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Initial Selection Panel Review

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

Please provide an overall evaluation rating.

Explanation of Recommendation Categories: Fund

- **As Is** (a proposal recommended for funding as proposed)
- **In Part** (a proposal for which partial funding is recommended for selected project phases or components)
- **With Conditions** (a proposal for which funds are recommended if the applicant contractually agrees to meet the specified conditions)

Consider as Directed Action in Annual Workplan (a proposal addressing a high priority action that requires some revision followed by additional review prior to being recommended for funding)
Not Recommended (a proposal not currently recommended for funding-after revision may be considered in the future)

Note on "Amount":

For proposals recommended as Fund As Is, Fund In Part or Fund With Conditions, the dollar amount is the amount recommended by the Selection Panel.

For proposals recommended as Consider as Directed Action in Annual Workplan, the dollar amount is the amount requested by the applicant(s).

Fund	
As Is	**X**
In Part	**-**
With Conditions	**-**
Consider as Directed Action	**-**
Not Recommended	**-**

Amount: **$$211,936**

Conditions, if any, of approval (if there are no conditions, please put "None"):

None.

Provide a brief explanation of your rating:

This was judged to be an exceptionally well-crafted proposal, which focuses on a topic (sex reversal) that could have significant, adverse population-level consequences for chinook salmon. The information from this work is considered essential to restoration of chinook salmon, given that the potential population-level effects of sex reversal are substantial and adverse, potentially leading to a skewed sex ratio dominated by males and a decrease in the number of breeding females in the population. The principal investigator has presented significant preliminary evidence of sex reversal based on recent analysis of 298 fall-run chinook salmon carcasses from the Sacramento River basin, the San Joaquin River basin, and two hatcheries in these basins. The likelihood of success in achieving stated objectives was considered to be very favorable, and the budget for the proposed work is reasonable. The information from this project will be important for ensuring restoration and long-term natural reproduction of chinook salmon. The project addresses several PSP priorities and has strong regional support. Information from the proposed work will also be important for focusing subsequent studies to identify the endocrine-disrupting compound(s) causing sex reversal in these populations.

The Panel recommends that the initial work de-emphasize within-tributary variation in the frequency of sex reversal (partly because of the downstream movement of spawned-out carcasses from upstream areas), and instead focus survey efforts on documenting the spatial extent of sex reversal in tributaries of the Sacramento and San Joaquin basins where fall-run chinook salmon spawn. This is viewed as a minor modification in the proposed plan of study.

Research and Restoration Technical Panel Review:

CALFED Bay-Delta 2002 ERP PSP
Research and Restoration Technical Panel Review Form

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

Review:

Please provide an overall evaluation summary rating:

Superior: outstanding in all respects;
Above Average: Quality proposal, medium or high regional value, and no significant administrative concerns;
Adequate: No serious deficiencies, no significant regional impediments, and no significant administrative concerns;
Not Recommended: Serious deficiencies, significant regional impediments or significant administrative concerns.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XSuperior	**The panel agreed that this proposal was clearly superior. With minor changes in sample collection strategy, we feel confident that an excellent study could result at very modest cost. Once more extensive data are available concerning among population variability in frequency of sex-reversal has been established, more explicit hypotheses should be constructed and tested so as to allow eventual determination of possible causes for this variation if it proves significant.**
-Above average	
-Adequate	
-Not recommended	

1. **Goals and Justification.** Does the proposal present a clear statement of goals, objectives and hypotheses? Does the proposal present a clear justification and conceptual model for the project?

   This proposal provided an exceptionally well crafted description of the potential population consequences (severely skewed sex ratios among progeny) that might result if the frequency of sex-reversed males were ever to reach high levels and progeny of sex-reversed males had viability similar to genetic females. From a structural perspective, the author should not have saved his preliminary evidence of sex-reversal until the Feasibility section of the proposal. Instead, these preliminary data ought to have been brought to the readers attention in the Justification section.

2. **Likelihood of Success (Approach, Feasibility, Capabilities and Performance Measures).** Is the project likely to succeed based on the approach, feasibility and project team capabilities? Are the proposed performance measures adequate for measuring the project's success?

Assuming that the author can rigorously defend his assessments of whether or not female-appearing fish are true genetic females or instead sex-reversed males, most of the objectives of the proposed research have a high likelihood of success. In particular, crossing experiments between sex-reversed males and genetic males should permit validation (or rejection) of presumed Medelian inheritance of the OtY1 marker (a marker of genetic maleness), and samples of wild and hatchery populations should shed substantial light on the degree to which sex-reversal may be taking place in the CV system.

3. **Outcomes and Products.** Will the project advance the state of scientific knowledge in general and/or make an important contribution to the state of knowledge of the Bay-Delta Watershed? For restoration proposals, is the project likely to contribute to ecosystem restoration or species recoveries in a significant way? Will the project produce products useful to decision-makers and scientists?

   This project should produce results that may be of substantial interest from both population dynamics and toxicology standpoints. Population consequences of widespread sex reversal could theoretically be very serious (substantial reduction in numbers of genetic females), and a search for possible causes of sex-reversal will no doubt emerge based on study findings.

4. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   This project had a very modest budget of $161k - $212k depending on whether funds were of state or federal origin. The Panel viewed this proposal as one of the more cost-effective proposals that was submitted.

5. **Regional Review.** How did the regional panel(s) rank the proposal (High, Medium, Low)? Did the regional panel(s) identify significant benefits (regional priorities, linkages with other activities, local involvement) or impediments (local constraints, conflicts with other activities, lack of local involvement) to this proposal? What were they?

   Regional reviews of this proposal were generally favorable: Sacramento and San Joaquin regions gave high rankings and the Delta region rank was medium.

6. **Administrative Review.** Were there significant concerns about the proposal with regard to the prior performance, environmental compliance and budget administrative reviews? What were they?

   No significant concerns were identified.

Miscellaneous comments:

Although the review panel was very supportive of the general topic of the proposed research, panel members and formal reviews expressed concerns regarding some study methods. In particular: (1) if samples were taken from spawned out carcasses, then it might be tough to maintain strict upper and lower reaches of streams for sampling purposes. Lower reaches might be contaminated by downstream movements of carcasses that originated from upstream areas; (2) the proposed bootstrap methods for determining whether or not presence of sex-reversed males differs across locations may require additional thought although the technique has considerable conceptual appeal; (3) it would be nice if the project were to propose collection locations and sample sizes that were better motivated from preliminary data and some initial tentative hypotheses that might explain the rather baffling variation in percentages of sex-reversed males among hatchery and wild populations. There is a strong possibility, especially in Battle Creek, that many of the fish presumed to be wild spawners are in fact hatchery strays. If sex-reversal somehow diminished hatchery homing rates sex-reversed males might be less

likely to return to hatcheries than to wild spawning grounds. This possibility and other plausible or implausible hypotheses might be used to better structure the proposed collections. In this preliminary study, we feel it would be a mistake to focus on within tributary variation (upper vs lower reaches) in frequencies of sex-reversed males. Instead, the proposal should put all its efforts into documentation of the extent of sex-reversal among as many Sacramento tributaries as possible, with continued focus on wild and hatchery populations in the same systems. When hatchery fish have their adipose fins clipped, stray hatchery spawners can be definitively identified among naturally spawning fish. This fact should be recognized in the design of field collections, especially in Battle Creek.

Delta Regional Review:

Proposal Number: 210

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

Sex-reversal appears to be a serious problem. The regional panel was shocked by the preliminary data collected for this study (see #1 below).

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   The work concerns fall-run chinook salmon collected from "tributaries in the Sacramento River basin (Battle and Clear Creeks, Feather and Yuba Rivers, Nimbus and Feather R. Hatchery), and the San Joaquin River basin(Merced, Mokelumne, Stanislaus, and Tuolumne Rivers, and Merced and Mokelumne R. Hatcheries)." No ESA clearances are needed to collect fall-run chinook salmon, just a DFG sampling permit.

   The major local constraint would be if sex-reversal does not occur in Central/San Joaquin Valley fall-run chinook salmon. However, the applicant has collected preliminary data that has yielded the following results: "Out of a total of 251 females screened, 42 (17% overall) tested positive for the presence of the Y-chromosome marker. The percentage of females testing positive for the Y-chromosome marker was much higher for Battle Creek, the Merced R., and the Mokelumne R (53%, 24%, and 38%, respectively) compared to the females from the Feather and Merced R. Hatcheries, none of which tested positive for the marker. All 47 male fall-run chinook salmon from the sites in the initial screening tested positive for the Y-chromosome marker."

   The regional panel feels that the reach-specific portion of the study is not technically feasible because carcasses move.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   From the Restoration Priorities for Multi-Region Bay-Delta Areas:

   "5. Ensure that restoration is not threatened by degraded environmental water quality

· Pollutant effects. Insufficient study of pollutant effects exist anywhere in the watershed. The studies most needed are those that evaluate effects expected within the context of the contaminated environment. For example, work is needed to better understand what causes fish mortality in the Central Delta; or if ecosystem processes or populations of species of concern, in areas undergoing restoration, are affected by pollutants. The Science Conference Summary noted the need for understanding contaminant effects, in an ecological/hydrologic context, as a large gap in knowledge about threats to restoration. General implications of contaminants for food webs is a special need. Linkages between contaminant exposure and physiological processes, reproduction and biomarker (biochemical) responses are needed for all pollutants."

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

   The applicant notes that he has had genetic work on fall-run chinook salmon funded by CALFED (P9940011 San Joaquin River Basin Fall-Run Chinook Salmon Genetic Baseline and Discrimination); seems like linking this work with the proposed work would improve the project (e.g, by being able to account for the effects of returning adults that stray).

4. Does the project adequately involve local people and institutions?

   XYes **-**No

   How?

   The applicant is from UC-Davis.

   It is unclear whether live, adult fall-run chinook salmon will need to be taken; preliminary samples were collected from "chinook salmon obtained during the 1999 carcass surveys." Informing the public may be necessary if live fish are taken. In any case the regional panel feels that sample collection should be coordinated with existing sampling efforts by CDFG.

Other Comments:

The regional panel notes that the merit of this project strongly depends on its technical feasibility/validity. Articles or reports that have been generated from the earlier study (see #3 above) may contribute to the technical review of this project.

The regional panel favors linking or adding a contaminants study component to this project that focuses on the specific compounds causing sex-reversal.

San Joaquin Regional Review:

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

Overall Ranking: **-**Low **X**Medium **-**High

Provide a brief summary explanation of the committee's ranking:

In general proposal is a good concept but there are questions on the committee regarding the actual implementation and utility of the project. Needs more background clarified and coordination/partners appear to be needed.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   There are no apparent constraints although the breeding experiments require expertise not listed.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   They meet the priority for MR #6 and SJ # 4 as they are dealing with an at risk species. Not certain if they the meet the priority goals for water quality MR #5 and SJ #5, but the assessment will provide some information on toxics in the rivers.

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   -Yes **X**No

   How?

   This project is not really performing local action but there are possible connections that have not been pursued, such as involving the collectors of the tissue samples more directly in the program.

4. Does the project adequately involve local people and institutions?

-Yes **X**No

How?

The project is intended to be implemented without local involvment. The applicant would probably benefit from local input on testing and interpretation of results.

Other Comments:

It is not clear how the samples stored in the CDFG tissue archive would be linked to specific locations which is usually need to understand exposure to toxics.

Sacramento Regional Review:

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

Overall Ranking: **-**Low **-**Medium **X**High

Provide a brief summary explanation of the committee's ranking:

The panel believes this is an important study that should be conducted. The proponents are well qualified to carry out the study. Please see additional comments below.

1. Is the project feasible based on local constraints?

   XYes **-**No

   How?

   This is an important study, which should contribute valuable information. The researchers have preliminary data and the expertise to conduct proposed studies. Sites for sampling have been identified and permits (CDFG collection) have been identified.

   This project should consider additionally studying winter-run Chinook and steelhead, for which sex-reversal information is already gathered.

2. Does the project pursue the restoration priorities applicable to the region as outlined in the PSP?

   XYes **-**No

   How?

   The project applies to PSP priorities: MR-5 (ensure restoration not threatened by degraded environmental quality); SR-7 (develop conceptual models to support restoration of river/riparian habitat); SJ-5 (understand/technologies to reduce impacts of irrigation drainage on San Joaquin River, and reduce contaminant loads to Delta and Bay; Primary goal of CVPIA's Anadromous Fish Restoration Program (ensure natural production of anadromous fish on a long term basis).

3. Is the project adequately linked with other restoration activities in the region, such as ongoing implementation projects and regional planning efforts?

   XYes **-**No

   How?

The project concerns at-risk species, and contributes to monitoring activities of CALFED's Comprehensive Monitoring, Assessment, and Research Program for chinook and steelhead in the Central Valley rivers.

4. Does the project adequately involve local people and institutions?

   -Yes **X**No

   How?

   Necessary infrastructure and equipment are available at UC Davis and CDFG. No local involvement is identified.

Other Comments:

External Scientific: #1

Research and Restoration External Scientific Review Form

Proposal Number: **210**

Applicant Organization: **University of California, Davis**

Proposal Title: **Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

Excellent: outstanding in all respects;
Good: quality but some deficiencies;
Poor: serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**I rated this as a "very good" proposal, but compared to the other CALFED proposals that I have read I would rate this one as excellent. I believe, however, that the proposal would benefit from rethinking its objectives based on closer inspection of preliminary data that have already been collected. As noted in my review, the findings of differences between naturally spawning and adjacent hatchery populations are baffling and worthy of more attention than this proposal seems to give them. I would rather see larger collections at fewer locations, with collections designed to look at both hatchery & wild fish on the same natural spawning grounds. Identity of unmarked fish would be unknown, of course, but marked hatchery fish on spawning grounds could be readily identified.**
-Good	
-Poor	

1. **Goals.** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Some of the null hypotheses are silly - the author already has evidence that they are incorrect - but hypotheses, goals and objectives are nevertheless clear and important.

2. **Justification.** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

   The potential repercussions of mating of sex-reversed males (XY, maturing with female gonads) with genotypic males and of subsequent generations of matings of "supermales" (YY) with normal females (XX) or sex-reversed males (XY) are illustrated exceptionally well in Figures 1 and 2. You almost don't need to read any of the rest of the proposal justification to realize that sex-reversal, if it happened on any kind of substantial basis AND if progeny from such mating were viable, could have enormous population-level repercussions on sex ratios and overall vitality of fish. The justification would have been even stronger if the author had not "saved" his preliminary data until the "feasibility" section on pages 10-11. These frightening data would have been better placed in the Justification section of the proposal.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   According to the narrative, a Y-chromosomal DNA probe, OtY1, has been previously used with success to determine the genetic sex of fall run chinook in a small sample of fish from the Sacramento system. Interestingly, sex reversal has not often appeared in Sacramento hatchery fish, similar to a finding by Nagler et al. (2001) cited in the text. Project results would definitely be novel - Nagler's results are only now beginning to circulate and cause alarm among salmon biologists throughout the Pacific Northwest. Crossing experiments are neat and essential.

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   The project seems feasible, but sample sizes from individual tributaries in the Sacramento system (40 from each location) seem small, especially becuase several systems contain a varitey of races and/or great variability in spawning timing. It would be nice to see if there were any "racial " component to variation in sex-reversed males. Also, it seems essential to demonstrate that fish returning to rivers but not hatcheries are in fact "wild" and not hatchery strays. For example, in at least the Feather and American rivers as well as Battle Creek it must certainly be the case that many fish spawning in the rivers are actually hatchery fish and not wild fish. Perhaps sex-reversed fish have impaired tendency to home to hatcheries, thus reducing their presence among hatchery returns? For these reasons, I believe that it is essential to sample some hatchery fish among wild spawners. This should be possible in at least Battle Creek and in Feather River because both Coleman NFH and Feather River Hatchery have substantial adipose-clipped & coded-wire tagged releases that could be readily identifiable as of hatchery origin. The apparent differences in % sex-reversed of wild as compared to hatchery fish are utterly baffling. I would have expected just the reverse based on rumors I have heard concerning appearance of endocrine-disrupting chemicals in commercial fish feed.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

quarterly reports, final techical report, presentation, manuscripts.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   see 5.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   May is a highly regarded geneticist and could certainly carry out this research.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   By CALFED standards, this proposal is reasonably priced. Unfortunately, May's detailed budget is in the web version only and was not send with the proposal hardcopy.

Miscellaneous comments:

External Scientific: #2

Research and Restoration External Scientific Review Form

Proposal Number: **210**

Applicant Organization: **University of California, Davis**

Proposal Title: **Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences**

Conflict of Interest Statements:
I have no financial interest in this proposal.
XCorrect
-Incorrect

In the blank below please explain any connection to proposal, to applicant, co-applicant or subcontractor or to submitting institution (write "none" if no connection):

none

Review:

Please provide an overall evaluation summary rating:

<u>Excellent:</u> outstanding in all respects;
<u>Good:</u> quality but some deficiencies;
<u>Poor:</u> serious deficiencies.

Overall Evaluation Summary Rating	**Provide a brief explanation of your summary rating**
XExcellent	**The overall summary rating was excellent because the topic is timely, the objectives, justification, and approach are described in the detail that should be expected of a research proposal.**
-Good	
-Poor	

1. **<u>Goals.</u>** Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the concept timely and important?

   Excellent: The hypotheses to be tested and objections of the research are outlined in an exemplary manner for a research proposal.

2. **<u>Justification.</u>** Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Excellent: The justification for the proposal is rated excellent because the applicant made the effort to explain the problem despite a very limited amount of information available on the topic. Figures 1 and 2 help explain the conceptual model.

3. **Approach.** Is the approach well designed and appropriate for meeting the objectives of the project? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology or approaches? Will the information ultimately be useful to decision-makers?

   Fair: The description on sample collection methods is cryptic at best. Collection of samples does not involve local, state, or federal agency partners; this may be a lost opportunity not an advantage. Depending on collection methods, inference on the reach-specific results may be valid on one tributary and not the next. In as much as collection methods are not adequately described I am not certain that incidental take will not occur for listed species. Furthermore, I'm puzzled that the "Land Use Checklist" question #2: Will the applicant require access across public or private property is answered "no."

4. **Feasibility.** Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives?

   Excellent: The controlled crosses experiment is adequately described but little infomation is provided other than it will be done at UCD.

5. **Project-Specific Performance Measures.** Does the project include appropriate performance measures to measure success relative to the project's goals and objectives? Is there enough detail as to how the performance measures will be quantified? For restoration projects, are monitoring plans explicit and detailed enough to determine if performance measures will be adequately assessed?

   Poor: Section on Performance Measures refers reviewers to section on products.

6. **Products.** Are products of value likely from the project? Specifically for restoration projects, are products of value also likely from the monitoring component? Are interpretative outcomes likely from the project?

   Excellent: The applicant expects to provide the products that should be expected of all projects in the "research" type. More outreach to local private, state, and federal entities should be added.

7. **Capabilities.** What is the track record of applicants in terms of past projects? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

   Excellent: The applicant has a demonstrated track record and infrastructure is available.

8. **Cost/Benefit Comments.** Is the budget reasonable and adequate for the work proposed?

   Very good: Budget appears to be resonable for a two year study and Budget Summary is filled out appropriately.

Miscellaneous comments:

Prior Performance/Next Phase Funding:

New Proposal Number: 210

New Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

1. Prior CALFED project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

2. Prior CVPIA project numbers, titles, and programs: (*list only projects for which you are the contract manager*)

   Biological Assessment of Green Sturgeon in the Sacramento-San Joaquin Watershed Contract #11332-1-G005

3. Have negotiations about contracts or contact amendments with this applicant proceeded smoothly, without persistent difficulties related to standard contract terms and conditions?

   XYes -No -N/A

   If no, please explain any difficulties:

4. Are the status, progress, and accomplishments of the applicant's current CALFED or CVPIA project(s) accurately stated?

   XYes -No -N/A

   If no, please explain any inaccuracies:

   Dr. May discusses his current salmon related projects, but not his green sturgeon projects.

5. Is the applicant's progress towards these project(s)' milestones and outcomes to date satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

6. Is the applicant's reporting, records keeping, and financial management of these projects satisfactory?

   XYes -No -N/A

   If no, please explain deficiencies:

7. Will the project(s) be ready for next phase funding in 2002, based on its current progress and expenditure rates?

   XYes -No -N/A

If no, please explain:

Other Comments:

Environmental Compliance:

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

1. Are the legal or regulatory issues that affect the proposal identified adequately in the proposal?

   -Yes **X**No

   If no, please explain:

   Fall-run collection methods are not described in the proposal. Depending on time of year and collection methods, incidental take of both state and federal listed species may occur. The applicant must consult with CDFG, NMFS, and USFWS for possible take of listed species.

2. Does the project's timeline and budget reflect adequate planning to address legal and regulatory issues that affect the proposal?

   -Yes **X**No

   If no, please explain:

   Time and money are not budgeted for CESA/ESA compliance for incidental take of listed species.

3. Do the legal and regulatory issues that affect the proposal significantly impair the project's feasibility?

   XYes **-**No

   If yes, please explain:

   If the applicant complies with environmental regulations and has the funding to do so, this project is feasible.

Other Comments:

Budget:

Proposal Number: 210

Applicant Organization: University of California, Davis

Proposal Title: Sex-reversal in Central Valley Chinook salmon: occurrence and population genetic consequences

1. Does the proposal include a detailed budget for each year of requested support?

   XYes -No

   If no, please explain:

2. Does the proposal include a detailed budget for each task identified?

   XYes -No

   If no, please explain:

3. Does the proposal clearly state the type of expenses encompassed in indirect rates or overhead costs?

   XYes -No

   If no, please explain:

4. Are appropriate project management costs clearly identified?

   XYes -No

   If no, please explain:

5. Do the total funds requested (Form I, Question 17A) equal the combined total annual costs in the budget summary?

   XYes -No

   If no, please explain (for example, are costs to be reimbursed by cost share funds included in the budget summary).

6. Does the budget justification adequately explain major expenses?

   XYes -No

   If no, please explain:

7. Are there other budget issues that warrant consideration?

-Yes **X**No

If yes, please explain:

Other Comments: